CLAIMS

We claim:

1. A method for splitting or combining optical signals, comprising:

subjecting odd and even channel sets to a first set of phase retardations corresponding with odd integer multiples of half a wavelength for each center wavelength associated with a selected one of the odd channel set and the even channel set and corresponding with integer multiples of a full wavelength for each center wavelength associated with the other of the odd channel set and the even channel set; and

subjecting the odd and even channel sets to a second set of phase retardations corresponding with integer multiples of a full wavelength for each center wavelength associated with the selected one of the odd channel set and the even channel set and corresponding with odd integer multiples of half a wavelength for each center wavelength associated with the other one of the odd channel set and the even channel set.

2. The method of claim 1, wherein subjecting the odd and even channel sets to a first set of phase retardations comprises:

filtering the selected one of the odd channel set and the even channel set with a first comb filer function; and

filtering the other of the odd channel set and the even channel set with a second comb filter function distinct from the first comb filter function.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

3. The method of claim 2, wherein subjecting the odd and even channel sets to a second set of phase retardations comprises:

filtering the selected one of the odd channel set and the even channel set with the second comb filter function; and

filtering the other of the odd channel set and the even channel set with the first comb filter function to broaden stopbands between adjacent odd channels and between adjacent even channels.

4. The method of claim 3, wherein each of the filtering acts further comprises asymmetrically coupling the optical signals onto at least one pair of fast and slow delay paths to effect the broadening of the stopbands.

5. The method of claim 1, wherein subjecting the odd and even channel sets to a first set of phase retardations comprises:

filtering the selected one of the odd channel set and the even channel set with a first comb filter function that exhibits a primary periodicity corresponding to twice a spacing between adjacent channels; and

filtering the other of the odd set of channels and the even set of channels with a second comb filter function that exhibits both the primary periodicity and a residual periodicity substantially equal to the primary periodicity and shifted in phase with respect thereto by π.

6. The method of claim 5, wherein subjecting the odd and even channel sets of a second set of phase retardations comprises:

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

filtering the selected one of the odd channel set and the even channel set with the second comb filter function; and

filtering the other of the odd channel set and the even channel set with the first comb filter function to broaden stopbands between adjacent odd and adjacent even channels.

7. The method of claim 1, further comprising splitting the odd channel sets from the even channel sets after subjecting the odd and even channel sets to the first set of phase retardations and before subjecting the odd and even channel sets to the second set of phase retardations.

8. The method of claim 1, further comprising combining the odd channel sets with the even channel sets after subjecting the odd and even channel sets to the first set of phase retardations and before subjecting the odd and even channel sets to the second set of phase retardations.

9. The method of claim 1, further comprising:

receiving the odd channel set and the even channel set at a single input port before subjecting the odd and even channel sets to the first set of phase retardations; and

outputting the odd channel set at a first output port after subjecting the odd and even channel sets to the second set of phase retardations; and

outputting the even channel set at a second output port after subjecting the odd and even channel sets to the second set of phase retardations, such that the odd channel set has been split from the even channel set.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

10. The method of claim 1, further comprising:

receiving the odd channel set at a first input port before subjecting the odd and even channel sets to the first set of phase retardations;

receiving the even channel set at a second input port before subjecting the odd and even channel sets to the second set of phase retardations; and

outputting the odd channel set and the even channel set at a single output port after subjecting the odd and even channel sets to the second set of phase retardations, such that the odd channel set and the even channel set have been combined.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

11. In a multiplexer that process optical signals, including an odd channel set and an even channel set, a method for combining the odd channel set and the even channel set, comprising:

receiving the odd channel set at a first input port of the multiplexer;

receiving the even channel set at a second input port of the multiplexer;

subjecting the odd and even channel sets to a first set of phase retardations corresponding with odd integer multiples of half a wavelength for each center wavelength associated with a selected one of the odd channel set and the even channel set and corresponding with integer multiples of a full wavelength for each center wavelength associated with the other of the odd channel set and the even channel set;

combining the odd channel set and the even channel set;

subjecting the odd and even channel sets to a second set of phase retardations corresponding with integer multiples of a full wavelength for each center wavelength associated with the selected one of the odd channel set and the even channel set and corresponding with odd integer multiples of half a wavelength for each center wavelength associated with the other one of the odd channel set and the even channel set; and

outputting the odd channel set and the even channel set at a single output port of the multiplexer.

12. The method of claim 1, wherein subjecting the odd and even channel sets to a first set of phase retardations comprises:

filtering the selected one of the odd channel set and the even channel set with a first comb filer function; and

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

filtering the other of the odd channel set and the even channel set with a second comb filter function distinct from the first comb filter function.

13. The method of claim 12, wherein subjecting the odd and even channel sets to a second set of phase retardations comprises:

filtering the selected one of the odd channel set and the even channel set with the second comb filter function; and

filtering the other of the odd channel set and the even channel set with the first comb filter function to broaden stopbands between adjacent odd channels and between adjacent even channels.

14. The method of claim 11, wherein subjecting the odd and even channel sets to a first set of phase retardations comprises:

filtering the selected one of the odd channel set and the even channel set with a first comb filter function that exhibits a primary periodicity corresponding to twice a spacing between adjacent channels; and

filtering the other of the odd set of channels and the even set of channels with a second comb filter function that exhibits both the primary periodicity and a residual periodicity substantially equal to the primary periodicity and shifted in phase with respect thereto by π.

15. The method of claim 14, wherein subjecting the odd and even channel sets of a second set of phase retardations comprises:

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

filtering the selected one of the odd channel set and the even channel set with the second comb filter function; and

filtering the other of the odd channel set and the even channel set with the first comb filter function to broaden stopbands between adjacent odd and adjacent even channels.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

16. In a demultiplexer that process optical signals, including an odd channel set and an even channel set, a method for splitting the odd channel set from the even channel set, comprising:

receiving the odd channel set and the even channel set at a single input port of the demultiplexer;

subjecting the odd and even channel sets to a first set of phase retardations corresponding with odd integer multiples of half a wavelength for each center wavelength associated with a selected one of the odd channel set and the even channel set and corresponding with integer multiples of a full wavelength for each center wavelength associated with the other of the odd channel set and the even channel set;

splitting the odd channel set from the even channel set;

subjecting the odd and even channel sets to a second set of phase retardations corresponding with integer multiples of a full wavelength for each center wavelength associated with the selected one of the odd channel set and the even channel set and corresponding with odd integer multiples of half a wavelength for each center wavelength associated with the other one of the odd channel set and the even channel set; and

outputting the odd channel set from a first output port of the demultiplexer; and

outputting the even channel set from a second output port of the demultiplexer.

17. The method of claim 16 wherein subjecting the odd and even channel sets to a first set of phase retardations comprises:

filtering the selected one of the odd channel set and the even channel set with a first comb filer function; and

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

filtering the other of the odd channel set and the even channel set with a second comb filter function distinct from the first comb filter function.

18. The method of claim 17, wherein subjecting the odd and even channel sets to a second set of phase retardations comprises:

filtering the selected one of the odd channel set and the even channel set with the second comb filter function; and

filtering the other of the odd channel set and the even channel set with the first comb filter function to broaden stopbands between adjacent odd channels and between adjacent even channels.

19. The method of claim 16, wherein subjecting the odd and even channel sets to a first set of phase retardations comprises:

filtering the selected one of the odd channel set and the even channel set with a first comb filter function that exhibits a primary periodicity corresponding to twice a spacing between adjacent channels; and

filtering the other of the odd set of channels and the even set of channels with a second comb filter function that exhibits both the primary periodicity and a residual periodicity substantially equal to the primary periodicity and shifted in phase with respect thereto by π.

20. The method of claim 19, wherein subjecting the odd and even channel sets of a second set of phase retardations comprises:

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

filtering the selected one of the odd channel set and the even channel set with the second comb filter function; and

filtering the other of the odd channel set and the even channel set with the first comb filter function to broaden stopbands between adjacent odd and adjacent even channels.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111